

**Technical Field of the Invention**

5 The present invention relates to a bottom unit of a stretch wrapping machine for rotating pallet goods, said bottom unit resting on a ground and comprising a turntable having a lower limiting surface and an upper limiting surface and being rotatably supported, by means of support rollers, on a base of the bottom unit, said support rollers resting on the  
10 base with peripheral portions thereof.

**Prior Art**

There are basically two different principles for bottom units of semi-automatic stretch wrapping machines for rotating  
15 pallet goods:

The most frequent type of a bottom unit comprises a base that constitutes foundation for a number of support rollers that are mounted in two circles, an inner circle and an outer circle. Above the support rollers the circular turntable is  
20 resting, said turntable being journaled radially around a shaft extension in the centre of the turntable. The height from the floor to the upper side of the turntable is usually 75-85 mm. Via an access ramp/inclined plane the pallet goods is normally pushed up manually on the turntable by means of a  
25 fork lift. With this type of bottom unit a large force is required to manually push heavy pallets up on the turntable via the ramp. Therefore, it is extremely important that the upper side of the turntable is located as close as possible to the ground since in this connection each cm is of extreme  
30 importance as regards the force that is required to push the goods up the ramp. The ramp often has an inclination of 2.5-3° and a length of about 1,3 m, which means that the ramp requires a large space.

The different type of bottom unit is a so-called "T-table" that constitutes a circular turntable having a cut out  
35 portion that enables the fork lift to enter inside the T-table without pushing the fork lift up along a ramp. The support rollers are mounted in the lower edge of the upper portion of the T-table and roll normally against a lower sheet metal

plate that abuts the ground. However, the method normally requires that the fork lift is elevated to its highest position since the fork lift is not pushed up to the table top where the pallet is placed. Also this type of table normally  
5 has a height of about 75-85 mm above the ground.

A certain jamming risk exists if somebody places his/her foot adjacent a corner of the cut out portion of the table at the wrong moment. To eliminate this jamming risk it is common to add a photocell beam in front of the T-table, said  
10 photocell sensing a foot and consequently the rotation of the table is stopped. The time of retardation of the T-table may sometimes become too long due to the fact that the friction drive against the periphery of the T-table may slip in connection with retardation and heavy load. Therefore, it is  
15 usual to have a relatively low speed of rotation in connection with this type of bottom unit. It is also difficult to locate the photocell beam to render a proper jamming protection.

A further disadvantage is that dirt and splinters etc. from the pallets easily are spread on the bottom plate and  
20 hence also on the support rollers, this inducing operational vibrations and also increased wear.

### **Objects and Features of the Invention**

A primary object of the present invention is to provide  
25 a bottom unit of a stretch wrapping machine where the table is located at the lowest possible level.

A further object of the present invention is to make it possible to use a very short access ramp.

Still an object of the present invention is that the  
30 bottom unit should be structurally simple.

At least the primary object of the present invention is realised by means of a bottom unit of the type defined above that has been given the features of the appending independent claim 1. Preferred embodiments of the invention are defined  
35 in the independent claims.

### **Brief Description of the Drawings**

Below an embodiment of the bottom unit of a stretch wrapping machine according to the present invention will be described, where:

- 5 Figs.1-2 shows schematically a stretch wrapping machine in operative position, where a piece of goods, the stretch film and the mast with the stretch film unit are schematically indicated;
- Fig. 3 shows a side view of the bottom unit according to the present invention;
- 10 Fig. 4 shows a top view of the bottom unit according to Fig. 3;
- Fig. 5 shows the main part of the base of the bottom unit;
- Fig. 6 shows the access ramp and the portion of the turntable that joins the ramp;
- 15 Fig. 7 shows the centre area of the turntable;
- Fig. 8 shows the turntable except further structural details;
- Fig. 9 shows the U-profile before the shaft holders are welded;
- 20 Fig. 10 shows a vertical view of a portion of the U-profile, the supporting rollers being mounted;
- Fig. 11 shows a partly sectioned side view with mutual location of the base, the turntable with the U-profile and its support rollers; and
- 25 Fig. 12 shows a view along A-A in Fig. 11.

### **Detailed Description of a Preferred Embodiment of the Bottom Unit according to the Present Invention**

- 30 The stretch wrapping machine, schematically shown in Figs. 1 and 2, comprises a bottom unit 1 according to the present invention, said bottom unit 1 being intended to rest on a ground in operative position of the machine. The stretch wrapping machine also comprises a mast 2 provided on the
- 35 bottom unit 1, said mast 2 supporting a stretch film unit 3 that is displaceable along the mast 2. The mast 2 and the stretch film unit 3 are drawn only schematically with dotted lines and they will not be described more in detail since they do not constitute essential parts of the present invention.

The bottom unit 1 and the access ramp 4 are shown in Figs. 3 and 4 where some enclosures and the mast 3 are deleted for reasons of clarity. The bottom unit 1 comprises a base 10 and a turntable 11.

5 When a piece of pallet goods is to be wrapped, said piece of pallet goods is normally elevated by means of a fork lift, then manually pushed up along the ramp 4 and subsequently located in the middle of the turntable 11. Then the actual wrapping starts by starting the rotation of the  
10 turntable 11 and the pallet goods is wrapped, usually by plastic film, so-called stretch film.

The above mentioned bottom unit 1 according to the present invention has a height between the ground and the upper side of the turntable 11 that generally is about 40-65  
15 mm lower than bottom units of stretch wrapping machines of similar type. In the above described embodiment of the bottom unit according to the present invention the upper limiting surface of the turntable 11 normally is at a distance of about 20-30 mm from the ground that the base 10 rests upon, said  
20 base 10 normally having a thickness of about 5 mm. The low level of the turntable 11 is essentially achieved by placing the support rollers 22 according to the present invention substantially above the lower side of the table 11. This will be described more in detail below. A centre bearing 14  
25 supports the load in the area around the centre of the turntable 11 in order to eliminate deflection in this area. Also the thickness of the turntable 11 has a great importance regarding the deflection and consequently the thickness has been chosen to about 12 mm which is about 50% more than the  
30 thickness of the turntables of most of the machines of similar type.

In the centre of the part of the base 10 that supports the turntable 11 a centre spigot 23 is provided, the turntable 11 being journalled on said spigot 23. The turntable 11 is  
35 supported by the support rollers 22 and the centre bearing 14 and is rotated by means of a driving wheel 12 that is driven by means of an electric motor 13. The motor 13 with the driving wheel 12 is intended to be suspended in a rigid, essentially rectangular plate that is hinged at one end and

spring loaded at the other end. Thus, the force from the spring imparts a suitable pressure of the driving wheel 12 against the periphery of the turntable 11, the driving wheel 12 being equipped with a friction material.

5 A photocell 19 detects a reflector 18 each time the turntable passes its zero position. For instance the signal is used to stop the table in correct position. The reflector may be moved between five different positions for different stop positions of the table 11 depending on the location of  
10 the ramp 4.

The support rollers 22 are mounted in the U-profiles 20 that are screwed on top of the table 11. The U-profiles 20 are bevelled about  $30^\circ$  at their ends 21 in order to allow the lower edge of the stretch film to pass over while the lower turns  
15 are wrapped on the pallet goods. The lowest film level is then about 1 cm above the bottom of the pallet.

An area 36 of the base 10, located outside the periphery of the table 11, is reinforced by several welded profiles 37 and rigidly connected to the plate 25 that constitutes base  
20 for the mast.

Fig. 5 shows the substantial part of the base 10 that is formed by a sheet metal plate suitably having a thickness of about 5-6 mm and manufactured by means of laser cutting or the like. The hole 29 is intended for attachment of the centre  
25 spigot 23 and the projections 17 with their holes 30 constitute an example of a possible attachment for the ramp 4 that can be located in five different positions in steps of an angle of  $45^\circ$  to the centre of the table.

Fig. 6 shows the access ramp 4 that in this case has an  
30 inclination of  $3^\circ$  and a length of about 275 mm. When using a conventional ramp, having a length of about 1,3 m, both the front and rear wheels of a manual fork lift of usual length will simultaneously roll in an upward slope during a part of the displacement while when using the short ramp 4 the front  
35 wheels of the fork lift will reach the horizontal table 11 before the rear wheels reach the lower part of the ramp, this meaning that an essentially lower weight must be pushed in an upward slope when using said short ramp 4. Spacings in the shape of plastic pieces 15 are received in holes 16 of the

turntable 11, said plastic pieces 15 being equipped with a collar 15a that on one hand prevents displacement upwards of the plastic pieces 15 relative to the turntable 11 and on the other hand constitutes contact portion against the base 10.

5 The plastic pieces 15 prevent a too large deflection of the portion of the table 11 that is located closest to the ramp. The table 11 is not able to be deflected or tilted too much when the plastic pieces 15 contact the base 10. Another function of the plastic pieces 15 is to prevent the base 10  
10 from touching the table 11 in case of a very irregular ground below the base 10.

When goods is to be entered on the turntable 11 via the ramp 4, the turntable 11 should assume the position shown in Fig. 4, i.e. the plastic pieces 15 should be located in front  
15 of the ramp 4.

Fig. 7 shows the centre of the table where the spigot 23 is fastened to the base 10, preferably by welding. A threaded hole 27 in the centre of the spigot 23 is intended for fastening a lifting device in connection with transport of the  
20 machine and is hence not described further. The centre bearing 14 functions as a radial bearing relative to the spigot 23 and as an axial bearing relative to a thin sheet metal plate 28 that has a low friction and is clamped between the spigot 23 and the base 10. For instance, it may  
25 constitute a self-lubricating plastic material that is pushed into the hole 29 in the table 11 but may also be fastened by gluing.

Fig. 8 shows the turntable 11 before various components have been mounted thereon. The manufacturing is suitably  
30 effected by laser cutting or the like.

Fig. 9 shows one of the U-profiles without the shaft holders 32. The manufacturing is suitably effected by laser cutting or the like and then the sides are bent to perpendicular positions relative to the web of the U-profiles.

35 Fig. 10 shows a top view of a portion of a U-profile 20 with two support rollers 22 mounted. The support roller 22 with its shaft 34 is mounted by initially being placed in the cut-out portion in the table 11. On top of the table 11 the U-profiles 20 are then fastened to the table 11 by screws that

are mounted through the holes 24. The roller shafts 34 are fixed in direction upwards by having the shaft holders 32 welded to the bottom of the U-profile 20.

5 Figs. 11 and 12 show the mutual location of the different parts adjacent to a support roller 22 and a section through the centre of the support roller 22. The support rollers 22 are to a substantial part located above the lower limiting surface 11a of the table 11, said limiting surface 11a being located about 7 mm above the base 10 that has a  
10 thickness of 5 mm. At these given dimensions the support rollers 22 may suitably have a diameter of about 36 mm. The upper limiting surface of the turntable 11 has been given the reference numeral 11b. Above the base 10 there is a space 31 of about 7 mm and above the space 31 the table 11 is located  
15 and on top of the table 11 the U-profile 20 is mounted, said U-profile 20 fixing the shafts 34 of the supporting rollers by the aid of the shaft holders 32 that are welded to the bottom of the U-profile. The support rollers 22 in the U-profiles are protected against dust and dirt by a cover that is mounted  
20 on top of the U-profile 20.

#### **Feasible Modifications of the Invention**

The bottom unit described above is intended for the most common pallet sizes but may also be manufactured for larger  
25 pallets and hence larger weight. The diameter of the turntable may be increased as well as the distance between the U-profiles 20 which means that a larger area of the turntable 11 is void of support between the U-profiles 20. This may however be compensated by choosing a somewhat thicker  
30 turntable. Also the support rollers 22 may be increased in number or alternatively somewhat wider support rollers are chosen that hold more roller bearings.

In the embodiment described above the support rollers 22 extend through openings in the turntable 11 and the adherent  
35 U-profile 20. However, within the scope of the present invention it is also feasible that the support rollers 22 have such a compact design that they do not extend through the upper surface 11b of the turntable 11 but are arranged in recesses on the lower side of the turntable, said recesses

having a depth that is smaller than the material thickness of the turntable 11.

5        Instead of fastening the shaft 34 of the support roller 22 in a U-profile 20 it is however also feasible within the scope of the invention to mount a sheet metal plate having a thickness of about 5 mm on each side of the support roller 22. The sheet metal plates that then have a hole for the shaft 34 are mounted first on the shaft 34 of the support roller and then mounted from below through the holes in the turntable 11. 10    If the sheet metal plates are somewhat wider down below the wider part constitutes a stop towards the lower limiting surface 11a of the turntable 11. In that way the U-profiles 20 are not needed. The support rollers 22 should however be protected by a strong cover.